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OBSERVATIONS ON LIFE HISTORY OF *OARISMA POWESHEIK* (PARKER) 1870

WILBUR S. McALPINE

2501 Bogie Lake Rd., Rt. 3

Union Lake, Mich. 48085

THE FOLLOWING NOTES, OBSERVATIONS AND LIFE HISTORY WORK on *Oarisma powesheik* was made during two seasons 1944-1945 and 1950-1951 at Lamberton Lake and Button Lake, which lies just east of Lamberton Lake, at Grand Rapids, Mich. I arrived at Lamberton Lake at about 2 P.M. on July 2, 1944 and collected there for balance of the day, making a careful search for *powesheik* all around the lake and along a creek which runs southerly from the lake, where I had found *powesheik* in previous years. I found one female specimen near the creek which was the only specimen observed. I saw two specimens of *C. muticum* at Lamberton Lake. Lamberton Lake has a marly bottom and the shore line is marshy and somewhat boggy, with shrubby cinquefoil growing in many places, accompanied with short marsh grasses and sedges. It is a typical marl bottom lake such as occurs in western Oakland Co. Small bog orchids and occasional yellow daisies and some ferns also occur on the boggy ground. Open hills occur to the west, and wooded areas to the east, surround the Lake at varying distances from the shore, leaving quite a marshy strip along the shore line.

The evening of July 2nd I stayed at a private home in Grand Rapids about two blocks west of road U.S. 131 and about two miles south of Lamberton Lake. On July 3rd, 1944, I explored Button Lake and found a fine colony of *powesheik* at N.W. corner and S.E. and E. side of the lake. The lake is similar to Lamberton Lake in general appearance, with similar marshy shore line. I found the butterfly quite plentiful here, the first specimens were found on flowers of white clover, that were in a lawn, which extended to the water's edge, in front of a

cottage. Just north of here along the lake and to an outlet stream which runs into Lamberton Lake I took eight or ten specimens, three on clover blossoms on a lawn and the balance in the short marshy grass area along the lake. I did not collect intensively but took sixteen more specimens along east shore of Button Lake.

Male specimens were attracted to flowers of yellow daisy. *O. powesheik* is usually hard to see on the wing, on account of its small size and swift flight. It flits its wings very rapidly and flies just above the grasses. One will see the white flash of its striped under surface of wings and must act very quickly in order to catch it. Sometimes, if not disturbed it will alight on the marsh grass or you will see it resting on the marsh grass and will have no trouble putting a net over it, but usually you will flush it up in walking through the grass and will have to act very quickly and have a very sharp eye to be able to follow it in flight and capture it. It is of course easy to catch if found on flowers of yellow daisy or on the shrubby cinquefoil. I caught two live females and put them in a bottle with some of the marsh grasses and took them home. One of the females was killed in the netting at top of the bottle but the other female laid sixteen eggs, three on the grasses and the balance on the sides and bottom of the milk bottle. These eggs were laid on July 4th and 5th, 1944. I found the female dead on the 6th and mounted it. All specimens taken at Grand Rapids at Button and Lamberton Lakes were practically in perfect condition, sixteen male and eight female. Twelve of the eggs hatched on July 13th and 14th and the other four on the sides of the bottle did not hatch. The caterpillars kept roaming around on the short marsh grasses, but would not eat. Four of them stationed themselves, head downward on a slight mat of silk near the tip of the blade of grass and remained stationary there until they died, refusing to eat. There were other small bog plants among the grasses brought home from Grand Rapids but the caterpillars refused to eat these. I obtained some tender lawn grass and put some of the caterpillars on this but most refused to eat. Three did however eat a little of the lawn grass. Finally two settled down each on a blade of lawn grass and started feeding regularly on it, eating along the edges of the blade. These two caterpillars, after starting to feed in earnest, remained each on a single blade of grass and did not move around, but stationed themselves on the underside of the blade, on the silken mat which they had made, with head usually

downward, but were quite sluggish and did not eat very much, usually only in early morning and late in the day. The caterpillar in its natural habitat evidently feeds on sedges or marsh grasses, although I did not get identifications of these.

EGG

One egg was laid near tip of blade of grass and another one on upper surface of blade of grass not far from tip. Size length 0.8 mm., width 0.7 mm., height about 0.5 mm. Color, pale yellowish green becoming darker and blotched with brownish just before hatching and showing outline of caterpillar within. It is mushroom shaped, with flattened bottom, smooth surface and being slightly depressed in micropyle. Eggs were laid July 5th, 1944 and hatched July 13 and 14, 1944, the length of egg stage being about nine days. Drawings were made of the egg, which appear in this paper.

First Caterpillar Instar or Caterpillar Stage

Length, 1.8 mm, when first hatched from egg July 13th and 14th, growing to about 4 mm. at end of instar on July 24th. Head large and prominent, in proportion to body, when first hatched, pale brown in color and in some cases with a darker brown stripe or patch (consisting of minute brown specks) on each side of face of head. Head smooth but very finely pitted or granulated. Head somewhat heart or wedge shaped, top being somewhat pointed, with slight depression at middle, face slightly depressed in middle of front. Body of caterpillar, legs and prolegs cream color, when first hatched becoming pale green as caterpillar feeds, with longitudinal light striping. No bristles on body except on last abdominal segment which has four minute colorless bristles at end of last segment. There are two colorless bristles on each side of head, one being just above mandibles. A drawing was made of this instar when first hatched, and also of the head, these drawings appearing in this paper. The length of this instar being about eleven days.

Second Caterpillar Instar

Both (the two remaining caterpillars) molted on the morning of July 24th for the first time. Length of caterpillar 4 mm. The cast off head dropped to the bottom, while the balance of molted skin remained fastened to the blade of grass, on the silken mat. The favored position of the caterpillar, while at rest, is near the end of the blade of grass, on upper surface, with head downward. It eats out chunks along the edges of the grass to the mid vein. The length of caterpillars at end of this instar which was Aug. 2nd, was about 7 mm. The length of this instar being about nine days.

Third Caterpillar Instar

Both caterpillars molted for the second time on Aug. 2nd, 1944. The caterpillars at end of second instar prepared a silken mat on either upper or lower side of blade of grass and fastened itself to it and remained there about two days before molting. It casts the head off first and pulls the rest of the caterpillar body out of the old skin leaving the cast off skin fastened to the blade of grass except the head which falls to the bottom. Caterpillars 6.5 mm. long just after molting for second time at beginning of third instar. Head and body grass green, body is striped longitudinally with very minute white or cream stripes, seven on each side of caterpillar, and one mid dorsally extending the full length of body. The lower white line, sub-stigmatal is the heaviest or broadest. The mid dorsal line is very fine, being hardly discernible, and slightly broken. On either side of this mid dorsal line is a dark green area, on the dorsal surface which is of a darker green, than on rest of the body. This darker green area is broadest at the center of the caterpillar and anteriorly and tapers to posterior end of the caterpillar where it runs out almost to a point.

The first longitudinal line or stripe from dorsal area is heavier than the fine mid dorsal line, the second line is fine and broken, the third line is heavier, the fourth line is fine, the fifth line is heavier, the sixth line is very fine and broken and the seventh or last line is substigmatal and is heavier than any of the other lines. The cast off molted skin was eaten by both of the remaining caterpillars shortly after the molt.

The caterpillar likes to wave its head back and forth when disturbed or when in search of food, although the caterpillar does not move around much but eats out gouges in the blade of grass to the mid rib. It rests much of the time on under surface of the blade of grass or surface of grass not exposed to direct light, about one third of way down from tip of blade. A favored stunt of the caterpillar, if transferred to new grass is to eat a small notch out of each side of the blade of grass, to the mid rib (the notches being close together and at about one half or one third of the length of the blade of grass from the tip). They then eat off end of the blade of grass, resting on underside of blade and between the cut notches and tip of blade. They are not heavy eaters and rest most of the time. They feed in early morning or near end of the day as a rule and rest with head downward toward base of stem of grass.

The head is lighter in color than rest of the body, and is a very pale green, inclined to clay color, with only a trace of brown color at apex of the head. There is a fringe of short, downwardly and outwardly curved colorless bristles on last abdominal segment. The spiracles are ringed with very faint brown, hardly discernible, except under high magnification. A drawing was made of the caterpillar at about end of third instar Aug. 18th and appears in this paper, length being 8.5 mm., width 0.8 to 0.9 mm. The actual length of caterpillars at end of this instar was 8.8 mm. and 9.3 mm.

Fourth Caterpillar Instar

The caterpillars in this instar are very similar in appearance and actions to those of the preceding instar.

Both caterpillars molted for the third time Aug. 18, 1944, length of one being 8.8 mm. and the other being 9.3 mm. at beginning of this instar. One caterpillar molted for fourth time at end of this instar, on September 12th, length being 11.5 mm., width 1 mm., height 0.8 mm., greatest height being at third abdominal segment. The other caterpillar molted on Sept. 16th, length about 10 mm. Length of fourth instar being about twenty-five days.

Fifth Caterpillar Instar

One caterpillar molted for the fourth time on September 12th, its length being 11.5 mm., width 1 mm., and height 0.8 mm., this date being the beginning of the fifth instar. Its greatest height was at the third or fourth abdominal segment. It is very similar in general appearance to the caterpillar in the preceding stage. The most conspicuous feature of the caterpillar is the dark green mid dorsal band, which tapers posteriorly almost to a point and extends into the head, where it flares out to the sides of the head, becoming horse shoe shaped in front of the head a little above the mandibles.

The dark green middorsal band is flanked on either side with a fine cream colored line, beyond which on each side of caterpillar are six other fine longitudinal cream colored lines. The lowest sub stigmatal line is broadest and more prominent. These fine lines on the sides of the caterpillar are very close together and give the caterpillar a yellowish green or cream color appearance in the sides, contrasting with the dark green mid-dorsal band. The upper side of head is lighter in color, as well as the horse shoe shaped figure in front, and an area just around the mandibles, while the interior center of head around horse shoe is darker green. The whole body of the

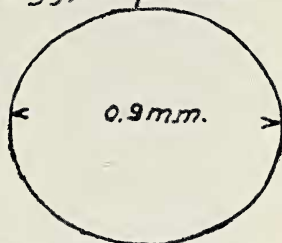
caterpillar and head is pale green or grass color in general appearance. The mandibles are brown, legs and pro-legs pale green, concolorous with body. The caterpillar is very sluggish in its movements and rests head downward and usually on underside of blade of grass. It spins a thin bed of silk, from the tip of blade to near its first notches cut out, to rest on when not feeding, and serve as a runway to go to end of blade of grass where it feeds. I presume this is done so that the caterpillar can cling more closely to the blade of grass in case of wind or storm. The caterpillar does not eat very much, and I have not observed it eating during the night. The two caterpillars became very sluggish the later part of September and remained in the same position, which was about midway down on the blade of grass and on under side, close to mid rib, with head downward. It made no preparation for winter and hibernated for the winter in this same position in this instar. It did not eat after the latter part of September and not until after hibernation. I kept the grass plant with the caterpillars on, in the house with windows open, until the first of November when I transferred the plant to a corrugated box about a foot square with cover on (not fitting tightly) and sides open, on our back porch, for the winter. We had a moderate Fall, and Winter weather began in early December. We had a very steady cold winter, with plenty of snow on the ground during December and January and until the middle of February, with continued low temperatures, a little above zero 8° to 12° for many days at a time during December and January, even with some sub-zero temperatures. There was no special protection provided for the hibernating caterpillars. The blades of grass became frozen, died and dropped down, but the caterpillars remained in the same position as before recorded. By the first of March the weather suddenly warmed up and we had a very mild March, the warmest I had ever experienced and along the later part of March, temperatures were close to 80° on several days, and grass was coming up in the lawns by the 24th, so I placed a fresh lawn grass plant in the box along side of the dried up plant the caterpillars were on, the caterpillars being still in the same position as previously recorded. We had some very warm days with temperatures close to 80° during the last ten days of March and I noticed on Mar. 29th that one caterpillar moved a little up on the dried blade of grass and ate a little of the dried blade of grass, so I pinned the two dried blades of grass, on which the caterpillars were, to the fresh lawn grass

Oarisma (Hesperia) powesheik (Parker 1870)

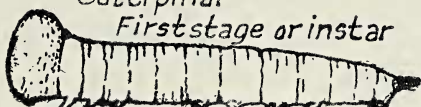
Egg, Side view



Egg, Top View



Caterpillar
First stage or instar

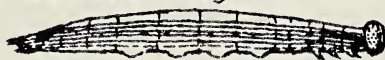


length at end of stage
4 m.m.

Face of head



Second caterpillar instar
at end of stage

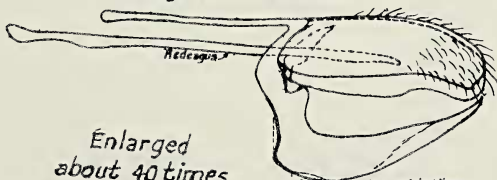


length 7.2 m.m.
height 0.2 m.m.

Third Caterpillar instar
at end of stage

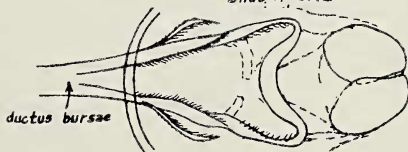


length 8.5 m.m.
width 0.8 m.m. to 0.9 m.m.
height 0.9 m.m.



Enlarged
about 40 times

♂ Genitalia, Side View
Slide No 277Q



♀ Genitalia, Ventral View
slide No 210Q

plant, and placed them in my den in the house, leaving the windows open. On Mar. 30th I noticed that the one caterpillar that had moved just previously, ate a little off the tip of a fresh blade of grass. It rained most of the 31st and I sprinkled the grass and caterpillars with water. I noticed that the other caterpillar had eaten some of a blade of the fresh grass on the morning of April 1st and ate a little more about 12 P.M. on the same day. One of these caterpillars molted on April 12th for the fifth molt and measured 19 mm., while the other caterpillar molted on April 26 for the fifth molt and measured 16 mm. The length of this instar (the 5th) being from about end of September and through hibernation period to about middle or latter part of April.

Sixth Caterpillar Instar

As before stated, about April 1st the two caterpillars started feeding on the fresh blades of lawn grass and one molted on April 12th for the fifth molt and measured 19 mm., while the other caterpillar molted on April 26th for the fifth molt and measured 16 mm.

One of these caterpillars molted for the 6th time on May 14th and the other caterpillar died about May 26th. The caterpillar that died remained in one position on the blade of grass for ten days evidently in molting position. It seemed have been feeding well before the molting period and I cannot understand the cause of its death. However, it may have been injured by a few ants which I discovered on the fresh food plant, that I had brought in. I killed the ants as soon as I noticed them. They were rather large ants and may have injured the caterpillar although there was no apparent injury. The length of this instar, the sixth, is either 32 days or 18 days, probably the latter, as my record is incomplete here. The length of the 6th instar then is evidently from about the middle or latter part of April to about the middle of May. The caterpillars in this instar looked very similar to those of the preceding instar.

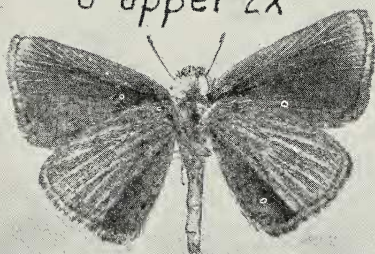
Seventh Caterpillar Instar or Stage

The one remaining caterpillar that molted on May 14th for the sixth molt has eaten more during this stage than in any of the preceding stages. It seemed to prefer the slender blades of grass near the base of the plant and eats most during the later part of the day. It will eat out a notch in the blade of grass to the mid rib, on each side of the blade of grass, about two thirds or one half way up from the base of the blade, and then crawl out to the end of the blade of grass and eat the blade

Oarisma powesheik



♂ upper 2x



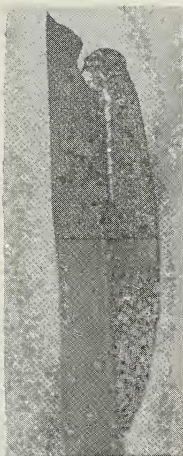
♂ lower 2x



♀ upper 2x



♀ lower 2x



Fifth instar lateral view



Fifth instar dorsal view



Chrysalis

of grass complete from the end downward, almost to where it first ate out the notches. The caterpillar sometimes moves around in a restless manner, maybe in search of better food or just before the molting period. It may even leave its food plant and crawl on the sides of the breeding cage and if left there would probably take up its position for molting. During these restless periods it will crawl out to the end of a blade of grass and extend its head and thoracic segments beyond the tip of the blade and wave its head and thoracic segments beyond the tip of the blade of grass and wave its head and that portion of its body back and forth, and if its head gets in touch of another blade or the side of the breeding cage the caterpillar will usually take hold of this object and pull the rest of its body to it.

At the beginning of this stage at end of sixth molt May 14th, the length of caterpillar was about 19mm. On May 30th the length of the caterpillar was 23.6 mm., greatest height 3 mm. at 2nd abdominal segment, width 2.8 mm. at 1st abdominal segment. May 30th may have been close to end of seventh instar but my records from seventh instar to imago have been either lost or misplaced. But judging from complete life histories of other small butterflies (such as *Calephelis muticum*, which I have made) *O. powesheik* should have one or two more caterpillar instars after the seventh instar, in addition to the chrysalis stage, before imago, so there is probably eight or nine caterpillar instars for *O. powesheik*. I have in my collection 35 *Orisma powesheik*, 13 taken on July 3, 7 on July 5th, 10 on July 9th, 1 on July 13, 2 on July 18, 1937, all being collected at Grand Rapids at Lamberton and Button Lakes in 1930, 1937, 1938, 1939, 1944, 1948 and 1950.

All of these specimens except two, taken by Dr. W. W. Necomb in 1930, were collected by myself. All but about six of these were males, it being difficult to determine sex by superficial examination. However, the genitalia of both male and female are very distinctive and drawings were made of them which accompany this article.

Recently *O. powesheik* has been taken in other localities in Michigan, in Livingston and Oakland Co.s and other places by M. C. Nielsen and R. W. Holzman. Mr. Holzman is making a special effort to study this butterfly and determine its distribution in Michigan. *Oarisma powesheik* was described by Parker in 1870 under *Hesperia powesheik* in Am. Ent. II 271, 1870. In Dyars list, 1902, it is listed Iowa, Ill. to Utah. I have one

specimen from Lake Okoboji, Iowa, June 26, 1927. U.S.N.M. Slide 2769. I have one specimen from Paradise Park, White Mts., Apache Co., Ariz., July 15, 1936. Chermock Coll. Slide No. 2772. I have one specimen from Riding Mts., Manitoba, June 6, 1934, Chermock Coll. which Chermock calls a new species but it is evidently *O. powesheik*, Slide No. 2771.

Oarisma powesheik is a small skipper butterfly (Hesperiidae Family) about an inch in expanse of wings. The ground color of entire upper wing surface is of a rather dark brown color with a narrow patch of light yellowish along the inner two thirds of costa, and with a few longitudinal very faint streaks of yellowish on the balance of fore and hind wings.

On the lower wing surface the ground color is also a rather dark brown color which is particularly evident on the primary wings and by a patch at the inner angle of the secondaries. On the lower wing surface there is faint yellowish coloring along the costa and outer part of the primaries. The lower surface of the secondaries is most conspicuous, with the veins on the upper and outer two thirds white and with the dark patch at the inner angle of the secondaries. The dorsal surface of abdomen, thorax, head and antenna is dark brown, streaked with faint yellowish, while the ventral surface of same is white.

Oarisma powesheik may be confused with *Thymelicus lineola*, a European species introduced into Michigan about 1930, but the latter is quite different having both upper and lower wing surfaces, almost entirely a light yellowish brown color, with edge of wings and veins black.